REMARKS

In view of the objections to the Specification set forth in the Official Action of October 7, 2002, a Substitute specification is submitted herewith which, it is submitted, meets the objections to the Specification as set forth in the Official Action.

Claims 1, 2, 43 and 44 were rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 5,740,757, of April 21, 1998, to Smeester. This patent is directed to a method and apparatus for feeding and performing certain procedures on a herd of bison, known also as American buffalo.

By this Amendment, Claims 1, 2, 43 and 44 have, in effect, been replaced by Claims 51-54. However, except for the style of the claims which is, in the new claims, somewhat more specific and the fact that the herd of animals involved has been designated as a "domesticated" herd of animals, the new claims are essentially the same as the cancelled claims.

As pointed out in the Official Action, the Smeester reference discloses an arrangement for managing a herd of animals which includes an animal identification system as well as a central unit and a computer having a memory. However, although it is stated in the Official Action that the memory is adapted to contain data for each buffalo in relation to its place in the hierarchic order and that the computer includes hierarchic order determining means, disclosures of same in the Smeester reference have not been found. In addition, it is submitted that Smeester leads away not towards Applicants' invention. Attention is thus invited to the statement in column 2, lines 5 and 6, that while a domestic animal may placidly share hay or feed supplements, bison are inherently different animals.

The instant invention is directed to the use of the hierarchic order of a herd as a management tool. Whereas Smeester certainly recognizes that bison herds include dominant
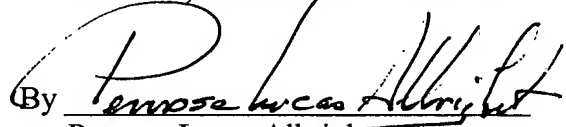
animals which claim excessive portions of feed when deposited on the ground and, indeed, intentionally separates the feed troughs or containers so that the individual bison do not see each other, there does not appear to be anything in the disclosure of the reference wherein Smeester's method and apparatus utilize the herd's hierarchic order as a management tool. Accordingly, it is submitted that the claims, as presently submitted, are not anticipated by Smeester under 35 U.S.C. §102 and also the reference does not teach modifications or adaptations which are suitable for rejecting the instant Application under 35 U.S.C. §103.

Further consideration and reexamination of this Application, in its amended form, is requested in view of 35 U.S.C. §132 and regulations in implementation thereof. It is submitted the Application in its amended form is free from ambiguity and avoids the references of record. It is further submitted the Examiner should have no difficulty in finding that the differences between the subject matter sought to be patented in this Application and prior art and usage within his expert knowledge are such that the subject matter as a whole would not have been obvious at the time the invention was made to persons having ordinary skill in the art to which the subject matter of this Application pertains.

In view of the foregoing, the allowance of claims as now presented is earnestly solicited.
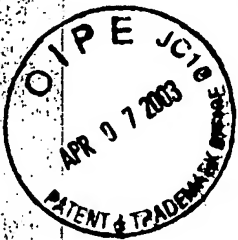
Respectfully submitted,

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AN ARRANGEMENT FOR AND A METHOD OF MANAGING A HERD OF ANIMALS

FIELD OF THE INVENTION:

The invention relates to an arrangement for managing a herd of animals, said arrangement comprising an animal identification system.

BACKGROUND OF THE INVENTION:

Such an arrangement is generally known. Although such an ~~the~~ arrangement functions satisfactorily and ~~takes over~~ relieves a dairy farmer a considerable amount of ~~much~~ time-consuming work ~~from a farmer~~, in practice there appears to be a need for an improved arrangement, ~~for it has~~ because, ~~appeared that there may be~~ for example, may occur great differences in waiting time for admitting ~~an~~ animals to a certain area.

It is an object of the invention to provide an arrangement for managing a herd of animals that ~~enables an~~ provides improved management.

SUMMARY OF THE INVENTION:

For that purpose an arrangement of the above-described type according to the invention comprises providing a central unit with a computer having a memory which includes data relating to the hierarchic order of animals in a herd ~~the measures mentioned in the characterizing part of claim 1~~. The invention is based on the insight that not only the arrangement for managing a herd is active for managing the herd, but that also the animals of the herd themselves participate in the management. In this connection especially the hierarchic order appears to play an important part. It occurs for example that a dominant animal pushes other animals away and is for example the first to take fodder. With dairy animals it often appears that a dominant animal wishes to be the first to enter a milk ~~box~~ ing compartment and that other dairy animals are pushed away by this dominant animal. By this partially self-managing behaviour of the animals of the herd the management carried out by the arrangement may be negatively influenced, which is not only undesirable for less dominant animals (undesired increase of waiting time for these animals), but also for the efficiency of the arrangement, for example when it comprises a milking robot. By taking into account, according to the invention, the hierarchic order within the herd, ~~there can be taken~~ measures

can be taken

*for providing an improvement both for the animals of the herd and the production of the arrangement.

In an embodiment an arrangement according to the invention is characterized in that there is provided a
5   hierarchic order determining means for determining data in relation to the hierarchic order, said hierarchic order determining means supplying the determined data in relation to the hierarchic order to the memory that stores these data. Such a hierarchic order determining means may be constituted
10   by the animal identification system, a camera or the like, possibly in combination with a computer. Due to this the arrangement generates itself the data in relation to the hierarchic order. Preferably the data are updated in the memory.

15   The herd is preferably managed by the arrangement at least with the aid of the data regarding the hierarchic order.

Although in general dominant animals try to be the first to gain access to an area or to obtain fodder, in some
20   cases it may occur that dominant animals are the last to gain access, precisely because *the first desire of* these dominant animals *is* first wish to dominate all the other animals. This behaviour is also called "jostling behaviour" and is present, as every farmer knows, to a greater or lesser extent with each animal. By not
25   only taking the hierarchic order but also the jostling behaviour into account, it is possible to obtain an optimally functioning arrangement. In an embodiment of an arrangement according to the invention this is achieved in that the memory is adapted to contain *for each animal* per animal data in relation to
30   the jostling behaviour. The herd is preferably managed by the arrangement at least with the aid of the data regarding the jostling behaviour.

If desired, the central unit may comprise an input means for inputting per animal *for example* e.g. by a farmer, data about
35   the hierarchic order *and* respectively about the jostling

behaviour. Additionally or alternatively these data may be generated by the arrangement itself.

In particular it has appeared that in the vicinity of gates the circulation may be negatively influenced by dominant, jostling animals. In an embodiment of an arrangement according to the invention said circulation can be improved when the arrangement is provided with an area for containing a number of animals, said area having an entrance gate ~~respectively~~ *and* an exit gate, the operation of at least one of the gates being controlled at least with the aid of data from the memory.

In order further to promote the circulation said area is preferably provided with at least two, possibly juxtaposed, entrance gates ~~respectively~~ *and* exit gates. As a result thereof the animals are enabled to choose another gate than that ~~whose~~ *wherein* passage is obstructed by a jostling animal.

The invention is in particular advantageously applied to an arrangement in which the area is constituted by a treatment area.

The treatment area is preferably constituted by a milking ~~parlour~~ *compartment* provided with a milking robot. Precisely in the situation of a milking ~~parlour~~ *compartment* provided with a milking robot the dominant ~~respectively~~ *and* the jostling behaviour may play an important part. Owing to the natural instinct of dairy animals to be milked, an animal may experience extremely much stress when it is prevented by a jostling animal from entering the milking ~~robot~~ *compartment*, which has a negative influence on the health of the dairy animal. Moreover, it may negatively influence the milk production. In an embodiment of an arrangement according to the invention, said disadvantageous behaviour is prevented at least for the greater part when in front of the entrance gate ~~respectively~~ *or* the entrance gates of the milking ~~parlour there is provided~~ *compartment is provided* a further area having at least one entrance gate for containing a limited number of animals.

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In order not to prolong unnecessarily the waiting time for dairy animals to enter the milking robot, an embodiment of an arrangement according to the invention is characterized in that the arrangement comprises a detection

5 device for detecting animals in the further area and for issuing a detection signal, *the* ~~a~~ detection signal indicating that animals are present in the further area keeping the entrance gate of the further area closed. As a detection device the animal identification may be used. As a result

10 thereof first all the animals present in the further area are *Provided an* ~~given the~~ opportunity to enter the milking ~~robot~~ *Chmiartment* before new animals are admitted to the further area.

Further it has appeared that at feeding stations the eating behaviour of certain animals may negatively be

15 influenced by ~~away~~ dominant, jostling animals. Therefore, the invention can in particular be applied advantageously to an arrangement provided with a feeding station with a feeding trough, an entrance opening to the feeding trough, a closing means for closing the entrance opening, and a feed supplying

20 device for intermittently supplying an amount of fodder ~~and/~~or drink *or both* into the feeding trough, the feeding trough being adapted to be closed at least with the aid of data from the memory. *To obtain*

~~For realizing an~~ optimal feeding of the animals of

25 the herd, an embodiment of the arrangement according to the invention is characterized in that the arrangement comprises a feeding station with several juxtaposed feeding troughs, each feeding trough being adapted to be closed at least with the aid of data from the memory. When for example it is

30 detected that an animal eating from a feeding trough is pushed away, the feeding trough can be closed. The animal that pushes away can then no longer obtain fodder from the relevant feeding trough and will soon leave said feeding trough, so that another animal, in particular the animal that

35 has been pushed away, can regain access to the feeding trough

by controlling the operation of the closing means by the computer with the aid of the data obtained from inter alia the animal identification system.

In a preferred embodiment of an arrangement according to the invention, the arrangement is provided with a detection device for determining the quantity of feed present in the feeding trough at a point of time after the ~~or both to the trough~~ supply of a quantity of fodder ~~and/or~~ drink and for issuing a first signal for operating the closing means ~~in dependence of~~ ~~based~~ ~~the result of~~ *on* the quantity determination. It has appeared that animals having made use of the feeding trough, even after there is no more feed present therein, still keep their heads in the feeding trough ~~during~~ *for* a short to a longer period of time *while* waiting for additional feed that may still be supplied. As a result thereof another animal that is ready to be fed cannot gain access to the feeding trough immediately. According to the invention this is prevented by operating, after an animal has ~~eaten~~ *consumed* at least a part of the quantity of fodder ~~and/or~~ *or both* drink, the closing means, ~~i.e.~~ *that is* by moving the closing means into the closing position, so that further access to the feeding trough is impossible for that animal. An animal that has just made use of the feeding trough is thus ~~urged to release the~~ *inclined move away from* entrance to the feeding trough.

The detection device preferably comprises a weighing device for weighing the quantity of feed present in the feeding trough. Said weighing device ~~enables to measure~~ *communicates* whether or not there is feed present in the feeding trough. As a result thereof it is possible for the weighing device, ~~e.g.~~ after, *for example* detecting that there is no more feed present in the feeding trough, to issue a signal ~~for the operation of~~ *which causes* the closing means ~~for~~ *to* clos~~ing~~*e* the feeding trough.

When the detection device ~~comprises~~ *includes* a clock, it is possible to measure how long the quantity of feed in the feeding trough remains untouched. By setting, ~~e.g.~~ *for example* an upper limit, after said upper limit has elapsed, ~~i.e.~~ *that is* after a

predetermined threshold time has elapsed, the clock can issue

a first signal for causing the closing means to close. In

particular when data from the weighing device and the clock

are combined, an extremely efficient use of the feed metering

5   device is possible.

In a preferred embodiment the arrangement is

provided with a clock for determining the duration from the

supply of a quantity of fodder and/or drink or both and for issuing,

based on
in dependence of the result of the determination of the

10   duration, a second signal for operating the closing means.

The arrangement is preferably provided with a closing means

operating device for operating the closing means on the basis

of the first and/or second signal, or both.

An embodiment of an arrangement according to the

15   invention is provided with a device for detecting jamming for

the closing means. This prevents an animal from being injured

during closing of the entrance opening to the feeding trough.

There is preferably provided an obstacle detector

for detecting an obstacle in the entrance opening. Such an

20   obstacle detector is preferably adapted to distinguish

animals and other objects from each other.

It has appeared that Animals, after having taken

much
the quantity of fodder, knock or kick with force against the in attempting
with force
feeding trough or a construction supporting same for trying

25   to obtain additional fodder. According to the invention this

undesired behaviour is prevented by providing an anti-

violence detector. When said anti-violence detector, which the feeding trough has been

for example,
may comprise, for a vibration detector, detects that there is

knocked or the like, against the feeding trough, said detector it

30   issues a signal for operating the closing means for closing

the feeding trough.

Preferably the feeding station is further provided

with an animal identification device for identifying a

particular animal that visits the feeding unit. Such an

35   animal identification device can be used extremely

advantageously for supplying a quantity of fodder or both
drink to the feeding trough ~~with the aid of data from the animal identification device~~. With the aid of data from the
animal identification device, the operation of the closing

5 means is controlled in an advantageous manner so that it is
possible to forbid a particular animal to enter the feeding
trough. ~~Just~~ Because the animal identification device is
adapted to identify a particular animal, said device is in obstructing from using the feeding trough that
particular suitable for ~~holding back~~ an animal wishing to

10 make use of ~~the feeding trough~~ at an undesired point of time.
Moreover, the animal identification device is adapted to co-
operate with the obstacle detector for obtaining an extremely
efficient functioning of the obstacle detector.

An arrangement according to the invention is in

15 particular characterized in that there is provided a device
for issuing a warning signal indicating that the closing
means is going to close. In this manner an animal ~~knows when~~ made aware that
the closing means is going to close and thus it is possible
to ~~learn~~ teach the animal to leave the feeding trough at the issue

20 of the warning signal, ~~e.g.~~ which may be, for example, a sound or a light signal.

Not only jostling animals may cause a disturbance
of the normal order of things at a feeding station, but also
so-called "gourmets" may cause a disturbance. A gourmet is an
animal that goes from one feeding trough to another and each

25 time only takes a small quantity of fodder (usually the best
part). Such a disturbance is avoided in an embodiment of an
arrangement according to the invention because of the fact
that the computer is programmed in such a manner that the
closing means of a third feeding trough is operated when the

30 data in the memory indicate that, within a predetermined
period of time, an animal has taken less than a first
quantity of fodder from a first feeding trough, and less than
a second quantity of fodder from a second feeding trough. The
first or both ~~and/or~~ second quantity, preferably amounts in to 0.75 kilogrammes,

35 while the period of time preferably amounts to fifteen minutes.

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The arrangement is preferably provided with a camera for observing the behaviour of an animal. By means thereof and by means of other devices, such as the animal identification system, the data in the memory can be updated.

5   In order to be able to influence the behaviour of dominant, jostling animals and to promote the management of the herd, the arrangement is provided with means of punishment for punishing animals impeding the management of the herd. Such means of punishment may preferably comprise

10 loudspeakers, punishment means that are adapted to ~~be put~~ _use_ ~~under~~ _an_ electric ~~tension~~ _voltage_ or blowing means or the like.

It is particularly advantageous when the means of punishment comprise a punishment device that is movable from an invisible to a visible position. The punishment device is _which, for example, may be_

15 preferably constituted by an inflatable object ~~e.g.~~ in the form of a cow, a wall or the like; a picture showing a frightening image; a partition wall or guide wall or the like.

It is particularly efficient when the means of

20 punishment comprise a vehicle moving forward automatically. Said vehicle may for example be controlled by cameras and image recognition programmes. However, a particularly accurately functioning vehicle is obtained when the animals are provided with an animal identification adapted to be

25 detected by a positioning system for determining the position of the animal, and when the vehicle moving forward automatically is controlled at least with the aid of data from the positioning system. As a positioning system GPS may, for example, be ~~taken into account~~ _used_.

30   The disadvantage of jostling behaviour for other animals can be obviated when the means of punishment comprise a punishment path that can be reached via an exit gate, so that the jostling animal is not rewarded for its behaviour.

The invention also relates to a method of managing

35 a herd of animals, in which method a number of automatic

animal related ~~treatments~~ *procedures* are performed, characterized in that the method comprises the step of determining the hierarchic order of an animal.

5 The performance of at least one of the automatic animal related ~~treatments~~ *procedure* is preferably controlled at least on the basis of the determined hierarchic order of an animal.

An embodiment of a method according to the invention comprises the step of determining the jostling behaviour of an animal, the performance of at least one of 10 the automatic animal related ~~treatments~~ *procedures* being controlled at least on the basis of the determined jostling behaviour of an animal.

The animal related ~~treatment~~ *procedure* comprises, in particular, opening ~~respectively~~ *or* closing ~~of~~ a gate. The animal 15 related ~~treatment~~ *procedure* preferably comprises ~~giving~~ *providing* access to a feeding trough.

The determination of the hierarchic order of the animals preferably takes place initially by manual input of data based on experience.

20 Alternatively or additionally the hierarchic order ~~respectively~~ *or* the jostling behaviour is determined and/or updated by determining the order in which animals of a herd enter ~~respectively~~ leave an area.

It is advantageous when the hierarchic order 25 ~~respectively~~ *and or both,* the jostling behaviour ~~is determined and~~ *are ascertained* /or updated, by determining the order in which animals of a herd make use of a feeding ~~and/~~or drinking station.

BRIEF DESCRIPTION OF THE DRAWINGS:

The invention will be elucidated hereinafter by way 30 of example with reference to the drawing, in which:

Figure 1 shows a schematic plan view of an arrangement according to the invention;

Figure 2 shows a part of a feeding station in an embodiment of an arrangement according to the invention; and

Figure 3 shows a part of a feeding station in an alternative embodiment of an arrangement according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Figure 1 shows a schematic plan view of an arrangement according to the invention comprising a shed 1 for containing a herd of animals. The shed 1 comprises inter alia a number of cubicles 2, feeding stations 3a and 3b, a milking compartment 4 with a milking robot 5, and a further area (waiting area) 6.

The arrangement is further provided with an animal identification system, which comprises reading units 10, 11, 12, 13, 14 and 15 for reading the animal identification device worn by an animal, in particular a cow. As known, data from the animal identification are centrally stored by a central unit 7 provided with a computer 8 having a memory 9 containing several memory files. Central unit 7 centrally controls the functions of the arrangement.

The waiting area 6 has a number of entrance gates 16, 17 and 18 (in the embodiment shown three). In the case that the entrance gates 16, 17 and 18 are side-by-side, as shown, there may be disposed partitions 19 and 20. Waiting area 6 further has a number of exit gates 21, 22 and 23 (in the embodiment shown three). One of these exit gates, as indicated by reference number 23 constitutes at the same time an entrance gate into the milking compartment 4. There are further provided selection gates 24 and 25 by means of which animals coming from the other exit gates 21 and 22 may be guided to milking compartment 4. Exit gate 21 and a selection gate 26 can also give access to a punishment path 27 in which a waiting gate 28 may be provided. And

In the embodiment shown, each feeding station 3a and 3b has several, side-by-side, as shown, feeding troughs 32. A feeding station having, however, only one feeding trough can also be applied within the scope of the invention. Each feeding

trough 32 is provided with a closing means ~~known per se~~ for closing the entrance to the feeding trough.

According to the invention, ~~the~~ memory 9 is provided *for each* ~~per~~ animal of the herd with data in relation to the hierarchic order of the animal ~~in the herd~~. These data can initially be inputted with the aid of the data based on *the dairy farmers* experience ~~as known to the farmer~~. ~~Possibly~~ Additionally, ~~and~~ when known, there can be inputted *data for each* ~~per~~ animal ~~data in~~ relat**ing** *its* to ~~the~~ jostling behaviour into the memory. However, the data in relation to hierarchic order and jostling behaviour can also automatically be generated and updated by the arrangement.

The functioning of the arrangement according to the invention will be explained in further detail with reference to the entrance to ~~the~~ milking *compartment* ~~parlour~~ 4 and the operation of the feeding stations 3a *and* 3b, in particular the operation of the closing means for the feeding troughs. However, it will be *appreciated* ~~obvious~~, that the invention is not limited to these two examples, but may be applied to all automatic animal related *procedures* ~~treatments~~ that are customary in managing a herd of animals.

When dairy animals wish to make use of ~~the~~ *a* milking robot 5 in the milking *compartment* ~~parlour~~ 4, they first have to enter the waiting area 6 via one of the entrance gates 16, 17 *or* 18. When one of the entrance gates is blocked by a dominant, jostling animal, another animal can use one of the other two entrance gates. A reading unit 12 detects which cow is present at which gate. With the aid of data regarding the hierarchic order (and data regarding the jostling behaviour, if any), and data regarding the history of the animal to be milked, the central unit 7 is enabled to control the opening of the entrance gates. There is in particular provided a detection device, for example constituted by a counting device at the entrance gates or a camera 29 provided for detecting the number of animals in the waiting area 6. When a predetermined number of animals has been reached, it is

possible for ~~the~~ central unit 7 not to allow animals to enter
the waiting area 6 until said area is completely empty. For
that purpose the detection device supplies a detection signal
to the central unit 7.

5   It is noticed that the camera 29 (and possibly
other cameras) is not only adapted to determine the number of
animals in the waiting area, but also to determine the
behaviour of the animals, for enabling updating of the data
in the memory if desired.

10   When the limited, predetermined number of animals
is present in ~~the~~ waiting area 6, ~~the~~ central unit 7 will
control the entrance to ~~the~~ milking parlour 4. Also in this
case an animal can choose between several exit gates 21, 22 and
23. ~~The~~ Central unit 7 opens one of these exit gates, based on, for example)

15   ~~on the basis of~~ data regarding milking history and hierarchic
order, so that the waiting time per animal does not increase
in an undesired manner. For that purpose there is provided a
reading unit 13. When an animal ~~has~~ need not ~~to~~ be milked, or
shows an undesired jostling behaviour, it is possible for the

20   central unit and to control the exit gates and the selection
gates 24, 25 and 26 ~~in such a manner~~ so that an animal is not
guided to the milking compartment ~~parlour~~ 4, but to a punishment path 27.

A dairy animal that has been milked by a ~~the~~ milking
robot 5 can leave ~~the~~ milking compartment ~~parlour~~ 4 through exit gates

25   34, 35 or 36. Also in this situation there are provided a
number of gates, which are ~~side~~. disposed side by side, because it has
appeared that very dominant, jostling animals may wait for
milked animals thus preventing them from leaving the milking
compartment ~~parlour~~. Now that there are provided several exit gates, an

30   animal that has been milked is able to choose a free exit
gate.

Only when all the animals admitted to the waiting
area 6 have been milked, or in any event ~~anyhow~~ have left the waiting area
and the milking compartment ~~parlour~~, which can be detected by the reading

units 13 and 15, the entrances to the waiting area

opened.
~~released.~~

The gates controlled by ~~the~~ central unit 7 also
provide the possibility of punishing an animal for undesired
5   behaviour. When for example the presence of an animal at a
certain gate is undesirable, said gate can be moved ~~such~~ so that
the animal is chased away. Furthermore, as described, the
animal can further be guided via a punishment path. It is
possible temporarily to ~~put a~~ apply an electric voltage to gate (or to all the gates if desired)
10 ~~temporarily under electric tension~~.

Loudspeakers 37 issuing a sound that is unpleasant
to animals may be used alternatively or additionally. There
may further be used blowing means 38 for chasing animals away
from undesired ~~places~~ locations where they are not by means of a strong air flow.

15   A very effective means of punishment is provided by
a vehicle 39 moving forward automatically. Said vehicle 39
may for example be controlled by cameras 29, 30, 31 and 40 and known
image recognition programs ~~known per se~~. However, a
particularly accurately functioning vehicle 39 is obtained
20 when the animals are provided with an animal identification
adapted to be detected by a positioning system for the forward movement
determining the position of the animal, and when ~~the~~ vehicle
39 ~~moving forward~~ automatically is controlled at least with
the aid of data from the positioning system. For that purpose
25 the vehicle 39 may be provided with an aerial 41. Of course,
also provided with means apply
the vehicle is ~~adapted~~ to ~~carry means of~~ punishment.

Due to the fact that ~~the or~~ each feeding trough 32
is adapted to be closed at least with the aid of data from
the memory, a correct feeding behaviour can be stimulated.
30 When for example ~~pushing away of~~ is pushed away by another animal, this can be an animal eating from a
feeding trough 32 is detected, ~~e.g.~~ by a camera 31 or 30 or
by an animal identification ~~in the~~ at feeding station 3a, 3b, or other means and
the relevant feeding trough 32 can be closed. The animal that
does not
pushes away is then no longer allowed to obtain fodder from
35 the relevant feeding trough 32 and will quickly leave said

feeding trough 32, so that another animal, in particular the animal that has been pushed away, can regain access to ~~the~~ feeding trough 32. With reference to Figures 2 and 3 the functioning of the arrangement at a feeding station will be set forth in further detail.

As described, the actions can be controlled on the basis of data, inputted manually by a farmer, in relation to the hierarchic order and the jostling behaviour of the animals.

However, the arrangement may be self-educating, and/or such that the inputted data are updated continuously with the aid of means determining the hierarchic order of the animals ~~respectively~~ and the jostling behaviour. The hierarchic order ~~respectively~~ and the jostling behaviour is preferably determined by determining the order in which animals of a herd enter respectively leave an area. This can take place by making use of, for example a camera or the animal identification device. An extremely accurate ~~proper~~ indication of ~~in relation to~~ the hierarchic order ~~respectively~~ and the jostling behaviour are obtained by determining the order in which animals of a herd make use of a feeding or both or drinking station. Also in this situation a camera or the animal identification can be used.

Although only a number of means of punishment are described, it will be appreciated ~~obvious~~ that alternative means of punishment may be used, for example a punishment device that is movable from an invisible to a visible position. In this connection there may be ~~taken into account~~ an inflatable object, for example in the form of a cow, a wall or the like, a picture showing a frightening image, a partition wall or guide wall or the like.

Figure 2 shows schematically a part of an embodiment of a feeding station 3a according to an embodiment according to the invention. At ~~the~~ feeding station 3a fodder or both or drink (hereinafter to be denoted by feed, by which is meant fodder or both ~~and/~~or drink) is supplied to an animal in

metered portions. The Feeding station 3a is provided with a feeding trough 42 for containing feed. An entrance opening 44 provides an animal, for example, but not exclusively, a cow, access to a feeding trough 42. An animal identification device 54 known per se is preferably disposed at the feeding station 3a and recognizes a particular animal approaching the feeding trough 42 and wishing to make use of it. A feed supplying device 56 supplies a quantity of feed into the feeding trough 42, possibly with the aid of data from the animal identification device 54, the feed from a non-shown feed stock landing in the feeding trough 42 via for example, a non-shown cover and a chute.

The Feeding station 3a is thus capable of recognizing a particular animal, such as a cow, for example by means of a transponder fitted on or to the cow. The feed supplying device 56 is controlled in a known manner known per se by computer programmes, ensuring that the correct quantity of feed is supplied to the relevant cow.

A closing means 46 is movable across an entrance opening 44 of the feeding trough 42. When the closing means 46 is moved across the entrance opening 44, the feeding trough 42 is made inaccessible to a particular animal, after which, as learned from it has appeared in practice, the animal will of its own accord leave release the entrance to the feeding trough 42 for a next animal. In the example shown, the closing means 46 is constituted by a plate-like element that is capable of rotating about an axis 60. Said axis 60 may be constituted by an axle driven by a motor which, as will be described hereinafter, is controlled with the aid of data in relation to the quantity of feed present in the feeding trough.

Figure 3 shows schematically a part of an alternative embodiment of a feeding station 3a to be applied to an embodiment of an arrangement according to the invention. In this embodiment the closing means is constituted by a feeding trough 43 itself which is designed

as a movable one. In the shown situation ~~the~~ feeding trough 43 is rotatably disposed about an axis 59 that may be constituted by a motor-driven ax~~is~~ ^{le}, said motor being controlled with the aid of data in relation to the quantity

5 of feed present in the feeding trough, as will be elucidated hereinafter. In order to prevent that, in the position in which the feeding trough 43 closes the entrance opening 45, ~~the~~ feeding trough 43 is provided with a wall portion 61 for catching remaining feed. Said wall portion 61 can also act as

10 a feed guide means for feed that is supplied by ~~the~~ *a* feed supplying device 55 into ~~the~~ *a* feeding trough 43.

   In the embodiments described, the closing means rotates about an axis, the closing means being driven by a motor controlled with the aid of data in relation to the

15 quantity of feed present in the feeding trough. For the purpose of providing, ~~besides~~ *not only* a simple but *also a* reliable ~~construction, also a~~ *and* compact construction, a roll 64 ~~respectively~~ *or* 65 is preferably driven by a motor 62 ~~respectively~~ *or* 63, which roll 64 *or* 65 contacts ~~the~~ closing means

20 46 ~~respectively~~ *or* 43. According to the invention the feeding station*s* 3a *and* 3b ~~are~~ *are* provided with a *corresponding* detection device 58 *or* 57 for detecting, after the supply of a quantity of fodder ~~and/~~or drink, *or both* that at least a part of the quantity of feed from the feeding trough 42 *or* 43 has been removed and for issuing

25 thereupon a signal for operating ~~the~~ closing means 46 *or* 43. Thus ~~it can be prevented that~~, after an animal has ~~eaten~~ *consumed* at least a part of the quantity of feed, *if* said animal remains standing at the feeding trough 42 *or* 43, by operating the closing means 46 *or* 43 after receipt of a signal from the *The animal will be induced to leave. Accordingly*

30 detection device 58 *or* 57, ~~so~~ an animal that has just made use of the feeding trough is then ~~urged~~ *induced* to ~~release~~ *leave* the entrance to the feeding trough. Such a detection device may be constituted for example by a camera capable of giving an estimation of the quantity of feed present in the feeding

35 trough by means of *an* image recognition program~~mes~~.

However, the detection device is preferably constituted by a *known* weighing device for weighing the feed present in the feeding trough. ~~Such weighing devices are known per se~~. With these means it can be determined how much feed a particular animal has used, and also whether remaining feed is present in the feeding unit. ~~The~~ Closing means 46 ~~of~~ *and* 43 *are* ~~is~~ then preferably controlled with the aid of data both from the animal identification device and data from the weighing device, so that the eating behaviour of a particular animal can be taken into account. The weighing device is capable of measuring whether or not, after the supply of a quantity of feed into the feeding trough, there is still feed present in the feeding trough, and how much remaining feed is left. As a result thereof the weighing device, for example after detection that there is no more feed present in the feeding trough, can issue a signal for operation of the closing means for closing the feeding trough.

As shown in Figure 2, the weighing device is constituted by a device 58 for determining the degree of pivoting of ~~the~~ feeding trough 42, and for deducing therefrom the weight of the feed present in ~~the~~ feeding trough 42. In this situation ~~the~~ feeding trough 42 is supported by ~~the~~ *a* load sensor 66 via a supporting arm, ~~the~~ feeding trough 42 pivoting about a hinge pin 67.

In the embodiment of Figure 3 the weighing device comprises the movable feeding trough 43 for weighing the feed present in the feeding unit. The feeding trough 43 is moved in a reciprocating manner by ~~the~~ *a* motor 63 driving ~~the~~ *a* roll 65. As a result of this movement there occurs a torque, ~~whose~~ *the* magnitude *of which* ~~is~~ determined by a device 57 for measuring the magnitude of the torque. ~~The~~ *device* 57 deduces the weight of the feed present in the feeding trough from the torque determined. The exact correlation between torque and quantity of feed can previously be determined by means of simple calibration tests.

The detection devices 58, 57 preferably include a clock, so that it is possible to measure how long the quantity of (remaining) feed in the corresponding feeding trough 42, 43 remains untouched. By setting for example an upper threshold, after said upper threshold has elapsed, that is after a predetermined threshold period of time has elapsed, the clock can issue a signal for closing the closing means 46, 43. In particular when data from the weighing device and the clock are combined, an extremely efficient use of the feed metering device is possible. This makes it possible for example to use for each animal a combination of data in relation to a lower threshold for remaining feed and an upper threshold for the time for operating the corresponding closing means 46, 43. Thus the closing means are operated when less than the lower feed threshold is present in the feeding troughs 42, 43 and longer than the threshold time. As a non-limiting example approximately 2% to 10% of the quantity of feed supplied by the feed supply device to the feeding trough may be a threshold for the quantity of remaining feed, and approximately ten to sixty seconds as a threshold period of time.

The embodiments of a feed metering device shown in Figures 2 and 3 are provided with a respective device 48, 47 for detecting jamming for the closing means 46, 43. Thus it is prevented that an animal is injured during closing of the entrance opening to the feeding trough. A known device for detecting jamming exists, for example, for automatically closing car windows. When the device for detecting jamming detects a jamming, said device ensures by controlling the closing means that the latter releases the entrance gate. Preferably the closing means is re-closed automatically after a short time, such as less than two seconds. When an animal does not release the feeding trough after the first closing of the closing means, the closing means will repeat the closing action until the entrance opening is

completely closed. When the closing means continues to open
and close, there may ~~have occurred~~ be a defect. Consequently it
is advisable ~~to perform closing of the closing means a~~
~~maximum number of times,~~ an alarm signal ~~being~~ to be issued after
~~this~~ maximum number has been reached. Said alarm signal may
be audible, visible or otherwise.

~~An~~ Obstacle detectors 50 and 49 ~~is~~ are provided for
detecting an obstacle in the entrance opening. Such an
obstacle detectors 50 and 49 ~~is~~ are preferably suitable for
distinguishing animals and other objects from each other. For
that purpose, the combination of same with the animal identification
device is advantageous, although image recognition equipment
is possible as well. An obstacle could for example be
constituted by the hand of a person cleaning the feeding
trough, it ~~then~~ being apparent that the closing means must not
be closed when the hand is present in the entrance opening.

The embodiments of the invention according to
Figures 2 and 3 also comprise an anti-violence detector 52 and
51 for detecting undesired kicking, knocking or the like
against a parts of the feeding stations 3a and 3b. When the anti-
violence detectors 52 and 51, which may comprise for example a vibration
detector, detects ~~that there is~~ when a part being kicked or knocked or the like against a
~~part of the feeding station~~, then said detector issues a
signal for operating the corresponding closing means 46 and 43 for closing the
feeding troughs 42 and 43.

There is preferably provided a device for issuing a
warning signal, ~~e.g.~~ such as a sound signal and/or a light signal, or both,
indicating closing of the closing means, so that the animals
are warned of closing.

Not only jostling animals may cause a disturbance
of the normal order of things at a feeding station, but also
so-called gourmets may cause a disturbance. A gourmet is an
animal going from one feeding trough (or feeding station) to
another and each time only takes a small quantity of fodder
(usually the best part). Such a disturbance is avoided

according to the invention in that the computer is programmed in such a manner that the closing means of a third feeding trough is operated when the data in the memory indicate that an animal has taken within a predetermined period of time

5 less than a first quantity of feed from a first feeding trough and less than a second quantity from a second feeding trough. The first ~~and/~~or second quantity, *or both,* preferably ~~amount(s)~~ *being* *About* *kilograms* to 0.75 ~~kg~~ (another quantity ~~is~~ *being* possible~~, as well~~), while the period of time, preferably amounts to ~~15~~ *fifteen* minutes (another

10 period of time ~~is~~ *being* possible ~~as well~~).

Although we have disclosed the preferred embodiments of our invention, it will be understood that it is capable of other adaptations and modifications within the scope of the following claims